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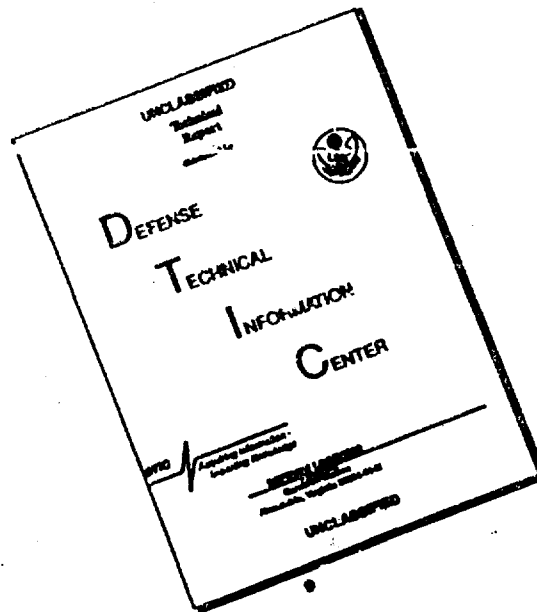
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Neuropathology and Psychiatry, USSR, Vol. 17, No. 5, 1943, Sept-Oct.

An Outbreak of Epidemical Encephalitis of an Unknown Etiology in the Drogobych Region, by N. I. Sokolov-Taezhnii, From the Virusological Division of the Drogobych Regional Hospital

In the summer and fall of 1946, in the Drogobych region, there were observed numerous severe infections of the central nervous system diagnosed by us as an epidemical encephalitis of an unknown etiology.

The majority of the illnesses (56%) were registered in the city of Drogobych or in its areas, the remaining cases in villages, sometimes separated by hundreds of miles. Centralization of the infections was not noted either in the areas or in Drogobych. True there were three cases of infection among the personnel of the hospital. The first illness was that of a nurse but her case was one of the first observed. They did not come in contact with those patients who were hospitalized in the infectious ward. From the infection of the nurse to the infection of the firstaid man, 56 days passed, and 59 days to the second. This led us to believe that the infection was not caused by direct contact, plus the fact that none of those employees attending the encephalitis patients contacted the infection.

The infection spread monthly as follows: June - 18.5%, July - 18.5%, August - 25%, September - 38%. No infections were observed either sooner or later.

All the patients categorically denied and indicated no bites of ticks, therefore anamnestically a majority of the patients encountered indications of contacts with mosquitoes. Before infection, many of the patients were subjected to sunstrokes.

69% of the patients came to us in the first 48 hours of infection, 18%

at the climax of the infection and 13% as convalescents, but with expressed symptoms requiring hospitalization.

By age the patients were classified as follows: under 10 years - 13%, 10-20 years - 31%, 20-30 years - 25%, 30-40 years - 31%. The males constituted 44% and the females 56%.

In a healthy state or after a short prodromal period, occurring in anamnesis in half of the patients and characterized by headaches, sometimes with pains and hyperemia in the nasopharynx circuit, with a feeling of inability, there appeared an apoplectiform of unconsciousness, replaced after the 2-3rd day by a deep deafening.

Thus, Patient K, 14 years old, went into the wood to pick berries and was carried back from there by his companions. Patient R, vacationing, complained of a pain in the throat and headache; 11 a.m. she took lunch to her father working at a factory, and at 12 noon she was brought home unconscious. Patient B went to sleep healthy on a hayloft and in the morning was found unconscious. Aidman Z, leaving for work in the morning, complained of a headache, and at 11 a.m., while sweeping up a corridor, fell unconscious.

In 19% of the cases the illness developed slowly, 3-5 days, and the acute status lasted 7-14 days, characterized by faded memory or deafness, severe headaches, expressed neurological symptoms and a rise in temperature.

In 31% of the cases the temperature was higher than 39 in the first 3-4 days, reaching 40.6, in 25% - from 38 to 39, in 19% - a subfebrile in the levels 37-38, and in 25% - no fever.

The severity of the infection and the degree of symptoms greatly veered from a parallel with the intensity of the fever. Thus, in Patient R, who died,

the temperature never went above 38. Patients Z and K - at the verge of a severe status, there was a subfebrile temperature (to 37.5) and that only on the 3-4th days of the Patient Z and on the 4-5th days of Patient K.

In 69% of the cases the temperature came to normal on the 5th day of illness, and only in 31% did the fever last 10-15 days.

At the climax of the illness the patients were affected seriously. In 75% of the cases the fading of the memory reached the stupor stage. The patients did not react to questions, examinations, were indifferent to all surroundings, did not eat, urinated under themselves. Sometimes they stereotypically repeated some word.

In 3 cases we observed an intense excitation; the patients tried to run somewhere, resisted examination, screamed, cynically argued. In one case there were auditory and optical hallucinations, to which the patient gave rich speech reactions. During convalescence there were the ordinary occurrences (cerebrasthenia).

Second place symptoms were: sharply expressed meningeal occurrences: severe headaches 100%, vomiting 87%, rigidity of the occiput 75%, Kernig's symptom 69%, Brudzinski's symptom 44%.

The meningeal occurrences lasted 5-6 days ordinarily, and then receded gradually.

A general hyperesthesia was very characteristic: painfulness of muscles and nerve stems during palpations, sometimes spontaneous pains in the shoulder area, small of back, larger nerve stems of the extremities, photophobia, a painful reaction to noise. Examination in part of the cases caused a torturing pain, sometimes causing unconsciousness.

The patients reacted to the lumbar puncture very poorly, even in an

unconscious status they moaned for a long time.

Deviations of the cranium nerves were observed in 75% of the cases. They appeared in the first days of illness and sometimes lasted 2-3 weeks gradually becoming obliterated. The affections usually were in combinations and were weakly expressed. They were localized as follows: dull reaction to light - 31%, light weakness of the muscles of expression - 31%, disorder of phonation - 25%, anisocoria - 19%, deviation of the tongue - 19%, a decrease in sight, hearing, disorders of the eye movements, paresthesia in the region of the innervation of the third nerve - 13%. In one case there was neuritis of the optical nerve, which quickly regressed; hyperemia of the papilla of the optical nerve was noted in 25% of the cases. Horizontal nystagmus was established in 69% of the patients; it was observed during an extreme turning of the eye-balls to the side and usually appeared near the end of the acute period, lasting in a majority of the cases until recovery was complete. Not once were we able to detect paralysis or paresis of the extremities. It is possible that they were missed in cases in which the unconscious status of the patients and their quick death obstructed a more complete examination. A partial symptom was the disorder of the muscular tone hypertonically. In one lethal case the rigidity of all the muscles penetrated according to a decerebrational type. In this very case, in the terminal stage, we observed a full atonia. In two patients, at the height of the illness, during a deep coma, we observed rotating of the head in all directions and a directing of both eyes in that same direction and upward.

In those patients who retained their consciousness, and during convalescence, we observed sharp unsteadiness in walking, resembling the Romberg sign, vibration

of the hands, eyelids, tongue, missing the finger-nose test, less so during the heel-knee tests. These ataxic disorders were observed in the first days of illness and lasted far into the convalescent period. In 81% of the cases we observed aniso-reflexes, sometimes cross, with the tendency in 56% of the cases to the lowering of the reflex down to its full fading. The knee reflexes suffered most of all, then the achilles and rarer the reflexes of the upper extremities. Skin reflexes in 31% were normal, in 25% higher, in 6% lower and in 38% they were completely absent. No inclinations were noted.

Pathological reflexes were noted by us in 69% of the cases. The Babinski, Gordon and Oppenheim symptoms were encountered identically in 50% of all cases, the reason for the Gordon symptom in all cases except one is two-sided; the Oppenheim symptom was two-sided in 75% of the cases, the Babinski symptom in 50%. In the two most severe cases (one ended in death) we observed a spontaneous extension of the thumb during the Lasegue test. The Rossolima reflex and Zhukovski symptom were not registered. The pathological reflexes lasted 15-20 days ordinarily, after the finish of the acute period.

In regard to the vegetative nervous system, we were not able to note any characteristic variations. In one-half of the cases, there was a relative bradycardia, in the other half, a moderate tachycardia. An increase of the perspiration-, fat- and saliva-secrections was not observed. Dermographia, heart-vessel reflexes - without vital peculiarity. The blood pressure held at ordinary, maybe slightly lower levels. Breathing - somewhat more frequent. In the terminal stage, in a case which ended with death, there was evidence of a Cheyne-Stokes respiration. The stool in 81% of the cases was slow. In the acute period, in 69% of the cases - urination under themselves. No vital varia-

tions of the internal organs were observed. In 3 cases, in the convalescent period, during a normal temperature, there were relapses characterized by the loss of consciousness, resumption of the meningeal occurrences, increase of the pathological reflexes. After 1-2 days all these occurrences disappeared. Patient K suffered 3 such relapses.

We analyzed the spinal fluid, blood, urine and excrement of all patients. Special analysis consisted of the Weil-Felix, Widal, Wasserman reactions and the search for *spirochaeta obermeieri* and the agents of malaria.

The chart of the spinal fluid is such: pressure somewhat increased; the fluid is colorless, transparent; positive Pandy reaction in 75% of the cases. Albumin from 0.16 to 4°/oo; erythrocytes from 2 to 20 in the field of vision, predominant 3-5; leukocytes 0-10 in the field of vision, more often 4-5. Dry residue: neutrophils, lymphocytes singular. Bacterial flora absent in 100% of cases. In 100% of cases absence of formation of pellicle.

In one case, on the 6th day of illness, the spinal fluid was slightly dimmed and xanthochromatic; Pandy reaction (+++), albumin 1.58°/oo, erythrocytes 33 in field of vision, leukocytes (lymphocytic) 10 in field of vision. The fluid was sterile. The illness progressed with a normal temperature, with a dimming of consciousness and an expressed neurological symptom. The patient signed out on the 46th day fully recovered.

The variations in the spinal fluid appeared on the 2-3rd days of the illness and quickly disappeared with the end of the acute period. In one case, in which death came the first day, the fluid was without any pathological variations.

Red blood without peculiarities, ESR gave significant fluctuations: to

12 mm in an hour - 54%, to 20 mm - 8%, to 30 mm - 8%, to 40 mm - 30%.

Only in 31% of the cases did we observe moderate leukocytosis from 8000 to 12,000. In the remaining cases we observed fluctuations of the quantities of leukocytes from 6000 to 8000. The eosinophils rarely (25%) were absent in the leukocytic formula. The quantity of segmented neutrophils was average - 60-65%; bacillo-nuclear neutrophils held an increased figure (6-8%) more often; the quantity of lymphocytes equalled 20-25%, monocytes - 1-1%. As a rule, these variations quickly leveled out. All the special reactions - Weil-Felix, Widal, Wasserman, search for the spirochaeta obermeieri, agents of malaria, and also a sowing of the excrement for Ebert bacilli, gave negative results in 100% of the cases. Urine was normal.

As was already pointed out above, the temperature on the 5-6th day usually fell. The consciousness of the patient became clearer, but their status was still several days in a severe classification. Approximately with the 10th day the meningeal occurrences disappeared, of these the most durative was the headaches and the rigidity of the occiput. By the 12-15th day sleep became normal while in the acute period there had been equal periods of sleeplessness and sleepiness. The variations of the reflexes and the pyramid signs lasted the longest. The psychology of the patients at this time had apparent characteristics of cerebraesthesia. We were able to release the patients only after 35-40 days. We examined 8 patients 4-5 months after their release. Only in one case did we find irregularity of the knee and achilles reflexes, nystigmus, insignificant psychic variation, such as apathia, sleepiness, increase of fatigue-ability and complaints of headaches.

In our cases, fatality composed 13%. Death took place on the 1-3rd day

of illness. Pathologo-anatomical analysis disclosed affection of the stem section of the brain.

Here are extracts from the protocols of autopsy (Prosecutor I. V. Ykoblev).

Patient P, 7 years. Died the first day of illness. The internal organs were without peculiarities. On the inner surface of the hard brain membrane, accordingly with the perietal portion of the brain, there were dense dark red laminated blood clots. The soft brain membrane was transparent and smooth. The substance of the brain was swollen and of a reddish color; the vessel of the brain was sharply expanded and filled with blood. The crustal stratum of a clear rose color. Ventricles of the brain were empty. In the stem section of the brain and on the bottom of the side ventricles there were light and heavy hemorrhages.

Patient B, 6 years. Died on the 3rd day of illness; was in the hospital 3 hours. The heart, liver and kidneys were parenchymally degenerated. The hard brain membrane came off easily. The soft brain membrane in the region of the frontal lobes in certain fissures was dimmed. The blood vessels of the brain were expanded and filled with blood. The cortex of both hemispheres was relatively of a reddish color, ventricles of the brain were empty. The substance of the brain was swollen. In the stem section there were light hemorrhages.

Simultaneously with the severe cases described above, we observed several patients with momentary nerve disorders which we find difficult to include in the group of patients ailing with encephalitis. Here is the description of one such case.

Patient O, 39 years, chauffeur; anamnesis without peculiarities. Married.

Smokes, uses alcohol rarely. Left in the morning fully healthy. Suddenly after 2 hours he stopped his machine declaring that he could not manage it because of a severe headache, seeing double, general weakness. Serious vomiting. Objectively: hyperemia of the face, dull appearance, sharp shaking of the hands; secondary vomiting. Felt better in an hour. Objective analysis gave no results. Was well after three hours.

Six more people came to us with complaints of this nature; no organic variations in regard to the nervous system were noted in them.

The data on the encephalitis observed in the Drogobych region are still insufficient for any kind of conclusions. We were deprived of the possibility of conducting any virological studies on our patients. We can only make several general conclusions.

The clinical and pathologo-anatomical charts forced us to consider it an epidemical encephalitis. A commission from the Ministry of Health of the Ukraine, SSR confirmed our conclusions. N. I. Grashchenkov, acquainting himself with our data, also approved our hypothesis.

The described infection differed from many other neuroinfections observed in our department with its strictly outlined seasonality. All the cases were registered from June to September with an increase of infections in August and with severe infections in September, after which there were no more infections.

Not having any entomological reports of ticks of the Drogobych region, we still can consider this season atypical for any type of tick encephalitis. All Soviet researchers working with tick encephalitis regard spring as the season of tick encephalitis. Also in the anamnesis of all our patients there were no reports of tick bites. Not once did we encounter an atypical paralysis

characteristic of tick encephalitis. But we must consider the opinion of Prof. Chumakov that the western tick encephalitis results in paralysis less often than the eastern. The cases of Economo encephalitis, studies simultaneously with the "Drogobych encephalitis" differed by its expressed vegetative and eye movement disorders, and also by the characteristic course of infection. Parkinsonism, prevalent with Economo encephalitis, was not once observed in our infection.

Our infection differed from the Djalangarski encephalitis by the absence of the avitaminous background, partial disturbance of consciousness, while with the Djalangarski encephalitis there is no dimming of consciousness, and an incomparably better prognosis.

By seasonal features and clinical chart it resembles a mosquito encephalitis. However, the clinical chart of the Drogobych encephalitis varies greatly from studied mosquito encephalides. (Comparison table see end of text)

The blood chart was nearer normal in the infection studied by us than in Japanese encephalitis; that is to speak of the quantity of albumin and cellular elements in the spinal fluid.

Also, the Drogobych encephalitis affected children more severely. This is opposite to the mosquito encephalitis which affects people of an older age.

CONCLUSIONS

1. The cases of encephalitis in the Drogobych region require further accurate studies.

2. According to immediate data it is possible to exclude it as a tick encephalitis.

3. The clinical chart of the infection is close to the chart of a light form of mosquito (Japanese) encephalitis, but not identical with it. ()

Comparison table: From text; An outbreak of an epidemical encephalitis
of an unclear etiology in the Drogobych region.

	Discribed infection	Mosquito (Japanese) encephalitis Grashchenkov--Altserovich--Zilher
Start of infection	hysterical onset in 81%.	Sharply developing
Conscious- ness	Gradual going over from a coma to a stupor and daze or deaf status.	Gradual development of deafness to a stupor.
Tempera- ture	Subfebrile or normal in 44%.	To 39 and higher.
Lenght of Fever	To 5 days in 65%.	6-10 days.
Paralysis	None	-Spastic in- -11-18%, dull- -in 11.5-33%
Lethality	13%	For Man- churia 37% For the Far- east USSR 44.8% For Japan 64.8%